



SLOVENSKI STANDARD

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Protection against electric shock – Common aspects for installation and equipment

Protection against electric shock – Common aspects for installation and equipment

Protection contre les chocs électriques - Aspects communs aux installations et aux matériels

STANDARD PREVIEW
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**Protection contre les chocs électriques –
Aspects communs aux installations
et aux matériels**

STANDARD PREVIEW
**Protection against electric shock –
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**PROTECTION AGAINST ELECTRIC SHOCK –
Common aspects for installation and equipment**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 61140 has been prepared by IEC technical committee 64: Electrical installations of buildings.

This second edition cancels and replaces the first edition which was issued as a technical report in 1992. It constitutes a technical revision and now has the status of International Standard.

It has the status of a basic safety publication in accordance with IEC Guide 104.

This standard is not intended to be used as a stand-alone standard.

The text of this standard is based on the following documents:

FDIS	Report on voting
64/952/FDIS	64/981/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

Annex A is for information only.

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INTRODUCTION

This International Standard is a Basic Safety Publication intended for use by technical committees in the preparation of standards in accordance with the principles of IEC Guide 104 and in ISO/IEC Guide 51.

The terms used throughout this standard which have been defined in clause 3 are printed in capitals.

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PROTECTION AGAINST ELECTRIC SHOCK – Common aspects for installation and equipment

1 Scope

This International Standard applies to the protection of persons and animals against ELECTRIC SHOCK. It is intended to give fundamental principles and requirements which are common to electrical installations, systems and EQUIPMENT or necessary for their co-ordination.

This standard has been prepared for installations, systems and EQUIPMENT having nominal or rated voltages not exceeding a.c. 1 000 V or d.c. 1 500 V. It may be used as guidance for higher voltages generated inside EQUIPMENT but it does not apply to high-voltage distribution systems.

The requirements of this standard apply only if they are incorporated, or are referred to, in the relevant standards. It is not intended to be used as a stand-alone standard.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards

ISO/IEC Guide 51:1990, *Guidelines for the inclusion of safety aspects in standards*

IEC Guide 104:1997, *The preparation of safety publications and the use of basic safety publications and group safety publications*

IEC 60050(131):1978, *International Electrotechnical Vocabulary (IEV) – Chapter 131: Electric and magnetic circuits*

IEC 60050(195): — *International Electrotechnical Vocabulary (IEV) – Chapter 195: Earthing and protection against electric shock¹⁾*

IEC 60050(826):1982, *International Electrotechnical Vocabulary (IEV) – Chapter 826: Electrical installations of buildings*

Amendment 1 (1990)

Amendment 2 (1995)

IEC 60364-4-41:1992, *Electrical installations of buildings – Part 4: Protection for safety – Chapter 41: Protection against electric shock*

IEC 60364-4-443:1995, *Electrical installations of buildings – Part 4: Protection for safety – Chapter 44: Protection against overvoltages – Section 443: Protection against overvoltages of atmospheric origin or due to switching*

¹⁾ To be published.

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IEC 60364-6-61:1986, *Electrical installations of buildings – Part 6: Verification – Chapter 61: Initial verification*

IEC 60417-2,— *Graphical symbols for use on equipment – Part 2: Symbol originals¹⁾*

IEC 60479-1:1994, *Effects of current on human beings and livestock – Part 1: General aspects*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*

IEC 60601-1:1988, *Medical electrical equipment – Part 1: General requirements for safety*

IEC 60664-1:1992, *Insulation co-ordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60721, *Classification of environmental conditions*

IEC 60990:1990, *Methods of measurement of touch current and protective conductor current*

IEC 61201:1992, *Extra-low voltage (ELV) – Limit values²⁾*

3 Definitions

For the purpose of this International Standard the following definitions apply:

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3.1 **ELECTRIC SHOCK** **(standards.iteh.ai)**

physiological effect resulting from an electric current through a human or animal body [IEV 195-01-04]

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3.1.1 **BASIC PROTECTION**

protection against ELECTRIC SHOCK under fault-free conditions [IEV 195-06-01]

NOTE – BASIC PROTECTION generally corresponds to protection against direct contact as used in IEC 60364-4-41.

3.1.2 **FAULT PROTECTION**

protection against ELECTRIC SHOCK under single-fault conditions (e.g. failure of BASIC INSULATION)

NOTE – FAULT PROTECTION generally corresponds to protection against indirect contact as used in IEC 60364-4-41, mainly with regard to failure of BASIC INSULATION.

3.2 **(electric) CIRCUIT**

an arrangement of devices or media through which electric current can flow [IEV 131-01-01]

NOTE – See also IEC 826-05-01 for electrical installations of buildings.

1) To be published.

2) A second edition is under consideration.

3.3**(electrical) EQUIPMENT**

any item used for such purposes as generation, conversion, transmission, storage, distribution or utilization of electrical energy, such as machines, transformers, apparatus, measuring instruments, protective devices, EQUIPMENT for wiring systems, appliances [IEV 826-07-01, modified]

3.4**LIVE PART**

conductor or conductive part intended to be energized in normal operation, including a neutral conductor, but by convention not a PEN CONDUCTOR or PEM conductor or PEL conductor [IEV 195-02-19]

NOTE 1 – This concept does not necessarily imply a risk of ELECTRIC SHOCK.

NOTE 2 – Definitions of PEM and PEL see IEC 195-02-13 and 195-02-14.

3.5**HAZARDOUS-LIVE-PART**

LIVE PART which, under certain conditions, can give a harmful ELECTRIC SHOCK [IEV 195-06-05]

3.6**EXPOSED-CONDUCTIVE-PART**

conductive part of EQUIPMENT which can be touched and which is not normally live, but which can become live when BASIC INSULATION fails [IEV 195-06-10]

NOTE – A conductive part of electrical EQUIPMENT which can only become live through contact with an EXPOSED-CONDUCTIVE-PART which has become live, is not considered to be an EXPOSED-CONDUCTIVE-PART itself.

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3.7**EXTRANEOUS-CONDUCTIVE-PART**

conductive part not forming part of the electrical installation and liable to introduce an electric potential, generally the electric potential of a local EARTH [IEV 195-06-11]

3.8**TOUCH VOLTAGE****3.8.1****(effective) TOUCH VOLTAGE**

voltage between conductive parts when touched simultaneously by a person or an animal

NOTE – The value of the effective TOUCH VOLTAGE may be appreciably influenced by the impedance of the person or the animal in electric contact with these conductive parts. [IEV 195-05-11]

3.8.2**PROSPECTIVE TOUCH VOLTAGE**

voltage between simultaneously accessible conductive parts when those conductive parts are not being touched, by a person or an animal [IEV 195-05-09]

3.9**TOUCH CURRENT**

electric current which passes through a human body or through an animal body when it touches one or more accessible parts of electrical EQUIPMENT or installation, under normal conditions or under fault conditions (IEC 60990, by analogy)

3.10**INSULATION**

NOTE – Insulation can be a solid, a liquid or a gas (e.g. air), or any combination.

3.10.1**BASIC INSULATION**

insulation of HAZARDOUS-LIVE-PARTS which provides BASIC PROTECTION

NOTE – This concept does not apply to insulation used exclusively for functional purposes. [IEV 195-06-06].

3.10.2**SUPPLEMENTARY INSULATION**

independent insulation applied in addition to BASIC INSULATION, for FAULT PROTECTION [IEV 195-06-07]

3.10.3**DOUBLE INSULATION:**

insulation comprising both BASIC INSULATION and SUPPLEMENTARY INSULATION [IEV 195-06-08]

3.10.4**REINFORCED INSULATION**

insulation of HAZARDOUS-LIVE-PARTS which provides a degree of protection against ELECTRIC SHOCK equivalent to DOUBLE INSULATION

NOTE – REINFORCED INSULATION may comprise several layers which cannot be tested singly as BASIC INSULATION or SUPPLEMENTARY INSULATION. [IEV 195-06-09]

3.11**NON-CONDUCTING ENVIRONMENT:**

provision whereby a person or an animal touching an EXPOSED-CONDUCTIVE-PART that has become hazardous-live is protected by the high impedance of his environment (e.g. insulating walls and floors) and by the absence of earthed conductive parts [IEV 195-06-21]

3.12**(electrically) PROTECTIVE OBSTACLE**

part preventing unintentional direct contact, but not preventing direct contact by deliberate action [IEV 195-06-16]

NOTE – Direct contact is defined in IEC 195-06-03.

3.13**(electrically) PROTECTIVE BARRIER**

part providing protection against direct contact from any usual direction of access [IEV 195-06-15]

NOTE – Direct contact is defined in IEC 195-06-03.

3.14**(electrically) PROTECTIVE ENCLOSURE**

enclosure surrounding internal parts of EQUIPMENT to prevent access to HAZARDOUS-LIVE-PARTS from any direction [IEV 195-06-14]

NOTE – In addition, an enclosure generally provides protection against internal or external influences, e.g. ingress of dust or water or prevention of mechanical damage.

3.15**ARM'S REACH**

zone of accessibility to touch extending from any point on a surface where persons usually stand or move about to the limits which a person can reach with the hand, in any direction, without assistance [IEV 195-06-12]

3.16**EQUIPOTENTIAL BONDING**

provision of electric connections between conductive parts intended to achieve equipotentiality [IEV 195-01-10]

NOTE – The effectiveness of the EQUIPOTENTIAL BONDING may depend on the frequency of the current in the bonding.

3.16.1**PROTECTIVE-EQUIPOTENTIAL-BONDING**

EQUIPOTENTIAL BONDING for purposes of safety (e.g. protection against ELECTRIC SHOCK) [IEV 195-01-15, modified]

NOTE – Functional equipotential bonding is defined in IEC 195-01-16.

3.16.2**EQUIPOTENTIAL BONDING TERMINAL**

terminal provided on EQUIPMENT or on a device and intended for the electrical connection with the EQUIPOTENTIAL BONDING system [IEV 195-02-32]

3.16.3**PROTECTIVE BONDING TERMINAL**

terminal intended for PROTECTIVE-EQUIPOTENTIAL-BONDING purposes

3.16.4**PROTECTIVE CONDUCTOR (symbol PE)**

conductor provided for purposes of safety (e.g. protection against ELECTRIC SHOCK) [IEV 195-02-09, modified]

3.16.5**PEN CONDUCTOR**

conductor combining the functions of both PROTECTIVE CONDUCTOR and neutral conductor. [IEV 195-02-12, modified]

3.17**EARTH**

NOTE – The concept EARTH means the planet and all its physical matter.

3.17.1**REFERENCE EARTH****REFERENCE GROUND (US)**

part of the EARTH considered as conductive, the electric potential of which is conventionally taken as zero, being outside the zone of influence of any earthing arrangement [IEV 195-01-01]

3.17.2**(local) EARTH****(local) GROUND (US)**

part of the EARTH which is in electric contact with an earth electrode and the electric potential of which is not necessarily equal to zero [IEV 195-01-03]

3.18**AUTOMATIC DISCONNECTION OF SUPPLY**

interruption of one or more of the line conductors, effected by the automatic operation of a protective device in case of a fault [IEV 195-04-10]

NOTE – This does not necessarily mean an interruption in all conductors of the supply system.

3.19**ENHANCED PROTECTIVE PROVISION**

protective provision having a reliability of protection not less than that provided by two independent protective provisions

3.20**(conductive) SCREEN**

conductive part that encloses or separates electric CIRCUITS and/or conductors.

3.21**PROTECTIVE SCREEN**

conductive SCREEN used to separate an electric CIRCUIT and/or conductors from HAZARDOUS-LIVE-PARTS

3.22**PROTECTIVE SCREENING**

separation of electric CIRCUITS and/or conductors from HAZARDOUS-LIVE-PARTS by a PROTECTIVE SCREEN electrically connected to the PROTECTIVE-EQUIPOTENTIAL-BONDING system and intended to provide protection against ELECTRIC SHOCK

3.23**SIMPLE-SEPARATION**

separation between CIRCUITS or between a CIRCUIT and EARTH by means of BASIC INSULATION

3.24**PROTECTIVE-SEPARATION**

separation of one electric CIRCUIT from another by means of

- DOUBLE INSULATION, or
- BASIC INSULATION and PROTECTIVE SCREENING, or
- REINFORCED INSULATION.

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[IEV 195-06-19, modified] standards.iteh.ai/catalog/standards/sist/d1263aa9-7ba6-4c7b-88b5-8aed36eb5805/sist-iec-61140-2000

3.25**ELECTRICAL SEPARATION**

protective measure in which a CIRCUIT that is hazardous-live is insulated from all other CIRCUITS and parts, from EARTH and from touch

3.26**EXTRA-LOW VOLTAGE (abbreviation ELV)**

any voltage not exceeding the relevant voltage limit specified in IEC 61201

3.26.1**SELV SYSTEM**

an electrical system in which the voltage cannot exceed ELV:

- under normal conditions, and
- under single-fault conditions, including earth faults in other CIRCUITS

3.26.2**PELV SYSTEM**

an electrical system in which the voltage cannot exceed ELV:

- under normal conditions, and
- under single-fault conditions, except earth faults in other CIRCUITS